LANCE DEVICE WITH RECIPROCATING DRIVE

The present invention relates to a lance device with flexible lances, such as for example of the type known from the Netherlands patent application 1012806 of the same applicant.

Pipe bundles of heat exchangers are cleaned using such a lance device. One or more lances are inserted into a corresponding number of pipes of the pipe bundle and fouling in the form of deposits is removed from these pipes by water exiting at high pressure at the front of the lances.

In the case of a lance device with flexible lances, the device comprises a drive which engages on the lance or lances and can drive them forward into the pipes and retract them again.

The object of the invention is to further improve such a known lance device.

This objective is achieved by reciprocating driving of the lances. That is, the lances are driven repeatedly forward and backward over a short distance. Driving in the forward direction takes place over a slightly greater distance than the return driving, so that the lance or lances gradually move forward.

It has been found that in this manner the efficiency of cleaning of the pipes is greatly increased. Jamming of the lance or lances against hard deposits in the pipe bundles is prevented to a far-reaching extent.

In the context of this application, reciprocating is also understood to mean: pulsating, i.e. driven repeatedly forward through small steps.

In a suitable embodiment the duration of the forward and backward driving is adjustable, so that it is possible to adapt to the conditions and in particular

to the seriousness of the fouling of the pipe bundle for cleaning.

The invention will be further elucidated on the basis of a description of the accompanying pneumatic diagram of an exemplary embodiment.

Standard symbols are used in the diagram shown in figure 1, so that this diagram is clear to a skilled person and it is possible to suffice with a short description of the operation.

In the diagram of the device 1 two drive motors for the lance driving device are designated with 2. These motors 2 are pneumatic motors which can operate in two directions. The operating direction is determined by the position of valves 6. In the further description the position of valves 6, corresponding with a first rotation direction of motors 2, is indicated by A and the second position of valves 6, corresponding with a second rotation direction of motors 2, is indicated with B.

Motors 2 are fed with compressed air under feeding pressure via lines 3. Further applied are pneumatic control pressures which are supplied via lines 4 and 7.

The pneumatic circuit comprises a shuttle valve 10 with which the driving can be set to manual control by operating the valve 11, or to automatic operation by operating the valve 12. It will be apparent that by operating the valve 11 the control pressure from lines 7, shown on the right in the figure, acts on the two-way valve 13, whereby this latter takes up the position shown in the figure and transmits the control pressure from line 4, via line 8, to line 14. When there is control pressure on line 14, the drive can be switched from A to B and back again using shuttle valve 15. When the control member of shuttle valve 15, which can for

instance be embodied as a joystick valve, is operated such that valve 17 is opened, the control pressure will be supplied via the AND port 19 to control valves 6 such that motors 2 are switched on in position B.

By operating the shuttle valve 15, whereby valve 16 is activated, the control pressure passes via the AND port 18 to the side of control valve 6, whereby the other rotation direction A of motors 2 is switched on. By suitable operation of valve 15 the lance can thus be driven in the direction back and forth.

When shuttle valve 10 is operated such that valve 12 is activated, with the intention of setting the automatic operating position, the two-way valve 13 is set in the position wherein the control pressure from control lines 17 is fed to line 20. Line 14 herein becomes pressureless, whereby operation of shuttle valve 15 no longer has any effect as a result of the operation of the AND ports 18, 19.

The control pressure in line 20 is transmitted via line 22 to the two-way valve 21. In the drawn position of this valve 21, the control pressure will then be fed via line 23 to time switch valve 24. The control pressure is fed simultaneously to control valves 6 such that these are set into position A.

After the time period set for time switch valve 24 has elapsed, time switch valve 24 opens and the control pressure is fed to a second time switch valve 25. After the time set for this valve 25 has elapsed, the control pressure is fed to two-way valve 21, whereby this latter is moved out of the shown position to the position displaced to the right.

The control pressure is hereby transmitted from line 20, via line 22, to line 30. The control pressure from line 30 arrives via line 31 at time switch valve 32 and simultaneously at control valves 6, which thereby

switch to position B, with the associated reversal of the rotation direction of motors 2.

Here too, after the time set for the time switch valve 32 has elapsed, this valve will open and transmit the control pressure to time switch valve 33, which opens after the time set for this valve and again feeds the control pressure via line 35 to two-way valve 21.

The two-way valve 21 hereby switches back to the drawn starting position, whereafter the pressure is fed once again to line 23, whereby control valves 6 are set in position A and the direction of movement of motors 2 reverses once again. The thus described operation is repeated continuously until valve 10 is switched to manual control, or until a valve (not shown) arranged in line 8 is closed.

It will be apparent that the time period in which the motors 2 rotate in the one direction A corresponds with the total time period set for valves 24 and 25, and the time period for which the motors 2 rotate in the opposite direction B is determined by the total of the time set for valves 32 and 33.

In the shown embodiment the respective time switch valves 24 and 32 can be bridged with the manually operated valves 26 and 34. The time period for direction A is hereby shortened to the time period of valve 25 and/or the time period for direction B is shortened to the time period of valve 33 only.

It will be apparent that with a suitable choice of the switch times for valves 24, 25, 32, 33 an appropriate reciprocating driving of the flexible lance or lances can be achieved.

It is noted that elements not shown here can be added to the pneumatic diagram of device 1. It will likewise be apparent that for instance a pulsating drive can only be obtained by replacing valve 21 with an on-

off valve. Such a possibility can of course be integrated into the pneumatic diagram of the device.

All these variations lie within the reach of the skilled person and must be deemed as lying within the scope of the present application.